CLAIMS

1. In an optical test system, the improvement comprising

a housing that contains at least eighteen laser source channels, and

a master controller internal to the housing operable for control of the laser source channels, the master controller having a common interface for commanding the laser source channels.

2. The optical test system of claim 1, comprising a volumetric density of greater than 9.5 laser source channels per cubic foot.

3. The optical test system of claim 1, comprising a vertical density of at least 2.0 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack.

4. The optical test system of claim 1, comprising at least forty eight of the laser source channels internal to the housing.

5. The optical test system of claim 4, comprising a volumetric density of greater than 9.5 laser source channels per cubic foot.

6. The optical test system of claim 4, comprising a vertical density of at least 2.2 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack.

7. The optical test system of claim 1, comprising at least one hundred of the laser source channels internal to the housing.

8. The optical test system of claim 7, comprising a volumetric density of greater than 15 laser source channels per cubic foot.

9. The optical test system of claim 7, comprising a vertical density of at least 4.5 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack.

10. The optical test system of claim 1, including a MUX located internal to the housing.

11. The optical test system of claim 10, the MUX being configured to produce a combined comb from the plurality of laser source channels.

12. The optical test system of claim 11, including an optical conditioning device internal to the housing in an optical pathway downstream from the MUX, the optical conditioning device being configured to provide optical processing on the combined comb.

13. The optical test system of claim 12, wherein the optical conditioning device facilitates combining service channel WDM signal processing with the combined comb.

14. The optical test system of claim 1, wherein the laser source channel comprises a laser source card and a channel option card.

15. The optical test system of claim 14, wherein the functionality of the channel option card is selected from the group consisting of a shutter, a variable optical attenuator, a polarization controller, a polarization scrambler, a power monitor, and a wavelength reference.

16. The optical test system of claim 15, wherein the channel option card includes a laser power monitor configured to measure laser power output from the laser source card.

17. The optical test system of claim 16, wherein the laser source card includes a laser source and associated electronics integral to the laser source card.

18. The optical test system of claim 17, wherein the laser power monitor is configured to provide laser power measurement information to the controller, the laser power measurement information being representative of the total laser power output from the laser source card including the laser source and the associated electronics.

19. The optical test system of claim 18, wherein the master controller is configured to adjust electrical power input to the laser source card to control laser power output based upon the power measurement information.

20. The optical test system of claim 1, including a modulation controller internal to the housing configured for use in modulating the laser source channels.

21. The optical test system of claim 20, where the modulation controller is capable of generating a plurality of waveforms for one of more channels.

22. The optical test system of claim 21, wherein the waveforms are selected to include at least two members of the group consisting of square waves, sawtooth waves, and sine waves.

23. The optical test system of claim 21, wherein the laser source card is programmably configurable to operate a switch accepting a selected one of the waveforms.

24. The optical test system of claim 23, wherein the laser source card includes a gain block that is programmably configurable to adjust an amplitude of the waveforms.

25. The optical test system of claim 24, wherein the gain block operates by attenuating the amplitude of the waveform.

26. The optical test system of claim 1, wherein the master controller is programmed with instructions comprising information and command exchange protocols that include at least one protocol selected from the group consisting of RS-232, GPIB, and Ethernet.

27. The optical test system of claim 1, wherein the master controller is operable for troubleshooting operations on the optical test system.

28. The optical test system of claim 1, including an optical power measurement module internal to the housing, the optical power measurement module being configured to accept optical input from external to the housing.

29. The optical test system of claim 1 including a data input device capable of reprogramming the optical test system with software upgrades.

30. The optical test system of claim 1, at least one of the laser source channels comprising:

a laser source card having

a first electrical connector operable for carrying electrical signals, and

a first optical coupling operable for carrying optical signals; and

a channel option card having

a second electrical connector compatible for mating engagement with the first electrical connector to facilitate communication of the electrical signals to the channel option card.

31. The optical test system of claim 30, wherein the housing comprises a mounting system deploying the laser source card and the channel option card sequentially.

32. The optical test system of claim 31, comprising a second optical coupling compatible for mating engagement with the first optical coupling to facilitate optical communication between the laser source card and the channel option card.

33. The optical test system of claim 31, wherein the mounting system includes a rail guide system for retaining the laser source card and the channel option card in a straight line.

34. In an optical test system, the improvement comprising:

a housing that contains a plurality of laser source channels, and

a MUX located internal to the housing for use in combining signals from the laser source channels.

35. The optical test system of claim 34, comprising a controller located internal to the housing for use in modulating the laser source channels.

36. The optical test system of claim 34, comprising at least eighteen of the laser source channels

37. The optical test system of claim 34, comprising a volumetric density of greater than 9.5 laser source channels per cubic foot.

38. The optical test system of claim 34, comprising a vertical density of at least 2.0 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack.

39. The optical test system of claim 34, comprising at least forty eight of the laser source channels internal to the housing.

40. The optical test system of claim 39, comprising a volumetric density of greater than 9.5 laser source channels per cubic foot.

41. The optical test system of claim 39, comprising a vertical density of at least 2.2 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack.

42. The optical test system of claim 34, comprising at least one hundred of the laser source channels internal to the housing.

43. The optical test system of claim 42, comprising a volumetric density of greater than 15 laser source channels per cubic foot.

44. The optical test system of claim 42, comprising a vertical density of at least 4.5 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack.

45. The optical test system of claim 34, including an optical conditioning device internal to the housing in an optical pathway downstream from the MUX, the optical conditioning device being configured to provide optical conditioning on the combined comb.

46. The optical test system of claim 45, wherein the optical conditioning device is selected from the group consisting of a shutter, a variable optical

attenuator, a polarization controller, a polarization scrambler, a power monitor, and a wavelength reference.

47. In an optical test system, the improvement comprising:

a housing that contains a plurality of laser source channels each including a laser source card having a laser source; and

a modulation controller internal to the housing capable of generating a plurality of waveforms for each laser source channel.

48. The optical test system of claim 47, wherein the waveforms are selected to include at least two members of the group consisting of square waves, sawtooth waves, and sine waves.

49. The optical test system of claim 47, wherein the laser source card contains a programmably configurable switch for use in accepting a selected one of the waveforms as drive input for the laser source.

50. The optical test system of claim 47, wherein the laser source card includes a gain block that is programmably configurable to adjust an amplitude of the waveforms.

51. The optical test system of claim 50, wherein the gain block operates by attenuating the amplitude of the waveform.

52. The optical test system of claim 51, wherein the laser source card includes a bypass mechanism that is programmably configurable to bypass the gain block.

53. The optical test system of claim 47, wherein the modulation controller includes

a plurality of waveform function output lines, and

a corresponding plurality of function generators allocated to each of the waveform function output lines, each function generator being capable of generating a generated waveform output on its corresponding waveform function output line.

54. The optical test system of claim 53, wherein the modulation controller includes

a number of waveform input connectors allocated to selected ones of the waveform function output lines, each waveform input connector being capable of receiving waveform input from an external function generator when an external function generator is connected to the waveform input connector, and providing the waveform input as output comprising an external waveform output, and

a corresponding number of programmably configurable waveform selection switches capable of selecting inputs between the generated waveform output and the external waveform output, each of the corresponding number of switches being allocated to one of the selected ones of the waveform input lines.

55. The optical test system of claim 54, wherein each of the selected ones of the waveform function output lines forms a shared rail system coupled in common with each of the laser source cards.

56. The optical test system of claim 55, wherein each of the laser source cards includes a programmably configurable rail selection switch capable of switching between the shared rail systems to provide selected waveform outputs as drive input for the corresponding laser source.

57. The optical test system of claim 56, wherein the modulation controller includes a coherence rail system in communication with each of the laser source cards, the coherence rail system including

a coherence control function generator capable of generating a coherence control waveform output and

a programmably controllable coherence rail switch capable of selecting between the coherence control waveform output and a ground.

58. The optical test system of claim 57, wherein the programmably configurable rail selection switch in each laser source card is capable of selecting between the coherence rail system and the shared rail systems to provide drive input for the laser source.

59. The optical test system of claim 47, wherein the modulation controller includes a digital modulation rail system including

a digital modulation function generator capable of generating a digital waveform output and

a programmably controllable digital modulation switch capable of selecting between the coherence control waveform output and a ground.

60. The optical test system of claim 59, wherein each laser source card includes a second switch capable of selecting between the digital modulation rail system and ground.

61. The optical test system of claim 60, wherein the laser source card includes a gain block for adjusting the amplitude of waveforms from the shared rail system and the second switch provides a bypass of the gain block.

62. The optical test system of any one of claims 1-61 produced by a method including the steps of preconfiguring the optical test system for use in test operations at a manufacturing facility prior to shipping the optical test system to a customer.

63. A method of performing an optical test using an optical test system having at least eighteen laser source channels, and a controller, all in a single housing, the method comprising the steps of:

energizing the laser source channels to provide test waveforms under control of the controller, and

performing optical test measurements through use of the test waveforms.

64. The method as set forth in claim 63, including a step of operating the optical test system through use of a unified set of program commands directed to the controller.

65. The method as set forth in claim 63 including a step of executing software diagnostics through use of a telecommunications linkage.

66. The method as set forth in claim 63 including a step of combining the test waveforms into a combined comb through use of a MUX located internal to the housing.

67. The method as set forth in claim 63 including a step of

operating the optical test system from a volumetric density of greater than 9.5 cubic feet per laser source channel.

68. The method as set forth in claim 63 including a step of

operating the optical test system from a vertical density of at least 2.0 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack

69. The method as set forth in claim 63, wherein the optical test system includes at least forty eight of the laser source channels internal to the housing, and the method includes a step of operating the optical test system from a volumetric density of greater than 9.5 laser source channels per cubic foot.

70. The method as set forth in claim 63 wherein the optical test system includes at least forty eight of the laser source channels internal to the housing, and the method includes a step of operating the optical test system from a vertical density of at least 2.2 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack.

71. The method as set forth in claim 63, wherein the optical test system includes at least one hundred of the laser source channels internal to the housing and the method includes a step of operating the optical test system from a volumetric density of greater than 15 laser source channels per cubic foot.

72. The method as set forth in claim 63, wherein the optical test system includes at least one hundred of the laser source channels internal to the housing and the method includes a step of operating the optical test system from a vertical density of at least 4.5 laser source channels per vertical inch in a standard nineteen-inch-wide equipment rack